Claim 68 (New): An integrated optical waveguide comprising:
a substrate;
one or more cladding layers comprising at least one cladding layer patterned to have at least one region with the cladding material absent; and
one or more light transmissive elements each comprising a waveguide and a lens as a unitary body; wherein said lens has a face perpendicular to the substrate and a lens face width at least 50% larger than the waveguide and focuses light in a plane parallel to the substrate.

Claim 69 (New) The integrated optical waveguide of claim 68 wherein at least one of said one or more cladding layers is composed of an organosilicon condensate polymer.

Claim 70 (New) The integrated optical waveguide of claim 68 wherein said one or more light transmissive elements and at least one of said one or more cladding layers are composed of materials chosen from a group comprising organosilicon condensate polymers, polymers, quartz, glass and semiconductors.

Claim 71 (New) The integrated optical waveguide of claim 68 wherein said substrate is composed of materials chosen from a group comprising silicon, quartz, fused silica, glass, or a polymeric material.
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Remarks

Addressing Examiners remarks as numbered:

10 & 11 & 12. [Claim 25] Applicants agree that the lens as described by Sun et al. will focus or receive light in a plane parallel to the substrate. However, light emitted from the Sun lens will have a point focus due to the shape of the lens as constructed; Sun's shape is optimum for Sun's application of traversing short distances with good alignment between the emitter and receiver. Applicant's requirements are completely different, requiring a "line focus"; in applicant's application the emitted light must traverse a substantial distance; tight alignment tolerances are impractical. Applicant's lens produces a "line of light" as opposed to a point of light from the Sun lens. The method of lens construction taught by Sun will not produce a waveguide with a line focus; therefore it can not anticipate the instant invention. In Figure 5B,

the Sun waveguide is receiving light from a laser diode. Applicant has amended claim 25 to further distinguish the lens type apart from Sun's; please note that Sun et al. teach a process which must result in a lens physically smaller than the associated waveguide.

10 & 11 & 12. Sun et al. teach one basic method of forming the lens which requires the cladding material surrounding the core waveguide, on all sides, to have an etch rate faster than the core material. In this manner the core is shaped and "protrudes" out of the cladding material after the etching step; a high temperature step is required to form the desired cone-like shape of the lens through a "reflow" process. In this scheme should a substrate be used as the lower cladding the substrate itself must have an etch rate faster than the core or the core is unable to "protrude"; being unable to protrude from the substrate when fired the core, in contact with the substrate, will wet the substrate; surface tension will not enable the formation of a lens. Figure 2B of Sun et al. shows a substrate as a lower cladding member; by implication when the substrate is the lower cladding material it is of a composition suitable for a lower cladding material. Claims 6 and 18 teach "silicon, ceramics and fused silica" as appropriate substrate materials; not withstanding the indefiniteness of the composition of "fused silica", none of these materials has an etch rate faster than doped silica as is required of an acceptable cladding material. Applicant asserts that these claims are not enabled, as well as the independent claims which permit an unclad substrate, claims 1, 2, 12, 14, 15, and 24.

Please note in the last line of Examiner's ¶ 12, indicating the "teaching" of silicon as a substrate; silicon, and "ceramics", without a cladding material is unacceptable as a substrate as the etch rate of silicon in 49% HF is about 1 A^{o} per minute, considerably slower than any type of doped glass; in buffered HF the Si etch rate is even slower. Note in Example 1 and 2 in the Sun

specification the computed etch rate is about 3.5mm for 4.5 hours and 5.5 mm for 4 hours, respectively; this averages to about 180,000 A° per minute. Applicant asserts that the Sun et al. invention can not be practiced with silicon, or ceramics, functioning as a substrate and with no intervening lower cladding material. A "Word" search of the Sun et al. specification finds no occurrence of "silicon" in the specification; silicon appears only in claims 6 and 18; these claims lack foundation in the specification.

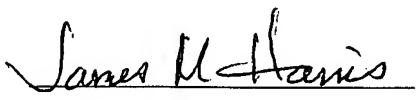
16. [Claim 35] Sun et al. invention can not be fabricated with a polymeric upper cladding; some polymers are resistant to HF etching and all polymers degrade above 500°C. Ghoshal teaches a very specific subset of siloxane resin polymers; application of the Ghoshal teaching to polymers not of his specific siloxane resin compositions may not result in a practical device. Applicant has restricted an upper cladding material to an organosilicon condensate polymer, the subject of US 6,818,721, owned by the same assignee, and clearly not taught by Ghoshal. Please note that the Sun invention requires doped oxide for the upper and lower cladding and waveguide; Ghoshal requires a proprietary siloxane resin upper and lower cladding and waveguide. In contrast, the instant invention makes use of a variety of materials for a substrate and lower cladding, when necessary; the idea, or even the suggestion, or motivation of this combination of materials is not present in either Sun or Ghoshal.

Claims 42, 43, 44, 66 and 67 now being dependent on an allowable independent claim are allowable as is.

Conclusion

Applicants respectfully cancelled claims 26, 28, 33, 34, 36, 37, 38, 39, 40, 41, 42, 46, 47, 48 and amended claims 25, 35; claims 68 - 71 are new . Applicants believe all claims are now in condition for allowance at the first office action.

Respectfully submitted,



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